

## NOMENCLATURAL AND TAXONOMIC CORRECTIONS IN WAREA (CRUCIFERAE)

R. B. CHANNELL AND C. W. JAMES

Errors in the treatment of *Warea* in Small's Manual (1933) were noted by us in 1958. After reviewing the taxonomy and nomenclature of the group and preparing corrections for publication, we discovered that our conclusions were in essential agreement with those published earlier by Payson (1923) in his monographic study of *Thelypodium* and its immediate allies. We had hence thought it inappropriate to publish our findings until recently, when a new name (*Warea auriculata* Shinnars [1962]) appeared which we consider a synonym of the earlier available name, *Warea amplexifolia* (Nutt.) Nutt. It is our purpose to clarify the application of the latter name and to reconcile certain discrepancies in the taxonomic treatments of the genus.

The species in question was first described by Nuttall (1822) as "*Stanleya ? amplexifolia*, foliis integris ? amplexicaulis, floribus corymbosis siliquis nutantibus." It was based upon material collected by N. A. Ware in the "arid pine forests" of "East-Florida." Accompanying the original description are the following observations, crucial to ensuing arguments concerning the application of the name: "Of this plant whose genus is consequently doubtful, we have seen only seeding specimens which Mr. Ware collected in the arid pine forests. The whole plant appears to have been smooth and glaucous, the stem terete, herbaceous, low, and branching towards the summit. With the radical leaves we are unacquainted, those few which remain on the stem are cordate-ovate, amplexicaule, and entire. The flowers have been aggregated in a close corymb; the peduncles are filiform. The siliques curved downwards, are conspicuously stipitate, flat and two and a half to three inches long, the stipe about three fourths of an inch, with the peduncle somewhat shorter. The dissepiment is equal and parallel with the valves. The seeds are alternately attached to either side of the suture of the dissepiment, and are small, brown,

oval, striated and compressed. The cotyledons are simple or undivided, and the radicle curved."

There is no reason to question either the "East-Florida" source of the type material of this species, as opposed to the northwestern arm of Florida where other Wareas are now known to grow, or to presume that Nuttall was at this time (1822) in the possession of a mixture of material from East and West Florida. The article in which the original description is published is entitled "A catalogue of a collection of plants made in East-Florida, during the months of October and November, 1821. By A. Ware, Esq." According to Nuttall, "The interesting fasciculus now collected by Mr. Ware, though made at an unfavourable season of the year, indicates the existence of a rich and varied Flora, and of a climate almost congenial to the cultivation of every important commercial production of the tropics." Such a statement would scarcely have been indicative of northern Florida, whether East or West, and leads to the supposition that the Ware plants were actually collected farther south in peninsular Florida. Such a supposition is borne out by the fact that a number of species listed in this "catalogue" are subtropical and reach their northern limit in peninsular Florida. Among these are:

<i>Amyris floridana</i> Nutt.	[= <i>A. balsamifera</i> L. ?]
<i>Chiococca racemosa</i> L.	[= <i>C. alba</i> (L.) Hitchc.]
<i>Cyrilla paniculata</i> Nutt.	[= <i>Ardisia escallonioides</i> Cham. & Schlecht.]
<i>Passiflora Warei</i> Nutt.	[= <i>P. suberosa</i> L.]
<i>Plumbago floridana</i> Nutt.	[= <i>P. scandens</i> L.]
<i>Psychotria lanceolata</i> Nutt.	[= <i>P. nervosa</i> Sw.]
<i>Rhizophora mangle</i> L.	

Other species listed in the catalogue which are not known to extend westward from "East-Florida" include:

<i>Befaria racemosa</i> Vent.	
<i>Liatris fruticosa</i> Nutt.	[= <i>Garberia heterophylla</i> (Bartr.) Merr. & F. Harper]

- Piper leptostachyon* Nutt. [= *Peperomia leptostachya*  
(Nutt.) Chapm.]  
*Tillandsia Bartrami* Nutt. [= *T. utriculata* L.]  
*Tillandsia tenuifolia* Sw. [= *T. setacea* Sw. or  
*T. simulata* Small]

Furthermore, Nuttall records a *Maranta* seen by Mr. Ware "about the latitude of 28°," which is essentially that of Tampa, Lakeland and Winter Haven. The latter two cities are located in Polk County, one of only four East Florida counties in which an amplexicaul-leaved *Warea* is known to occur. Considerable credence is thus established for "East-Florida" as the intended meaning and for the peninsular source of the type material.

Nuttall's query and stated uncertainty concerning generic placement of the plant were resolved with the description by him of the new genus *Warea* in 1834. In this work the combinations *Warea cuneifolia* (Muhl. ex Nutt.) Nutt. (based on *Cleome cuneifolia* Muhl. ex Nutt. Gen. N. Am. Pl. 2: 73. 1818) and *Warea amplexifolia* (Nutt.) Nutt. were made. At this time, however, Nuttall lists the habitat of *W. amplexifolia* as "In West Florida", instead of "East-Florida." Between the time he described *Stanleya amplexifolia* from East Florida (1822) and the time he published the combination *Warea amplexifolia* (1834), Nuttall received additional material of *Warea* from West Florida, perhaps from Ware himself, since Ware was known to have collected in West Florida in the interim (cf: Nuttall's description, 1834, of *Chrysoma solidaginoides* from West Florida collected by Ware "several years ago"). There can be no question that Nuttall actually received additional specimens of *Warea* during this period, for his amplified description of *W. amplexifolia* (1834) is accompanied by observations of the flowers, which were not seen by him at the time of the earlier publication. Moreover, the plant illustrated in 1834 is clearly representative of a West Florida species (later described as *W. sessilifolia* Nash), not the one described from East Florida twelve years earlier.

It may be noted from the amplified description ("Foliia oblongo-ovatis semi-amplexicaulibus, siliquis ancipitibus

pendulis, *Stanleya amplexifolia*, Nuttall, in Silliman's Journal, vol. 5, p. 297. Plate 10.") that Nuttall referred appropriately to the leaves of the West Florida plants as "oblongoovatis semi-amplexicaulibus" rather than "integris ? amplexicaulibus" as he had done when originally describing the species based only upon plants from East Florida. This reflects, it would appear, the difference in the two species. In the later account the calyx and corolla are both described as lilac purple, characteristic of *W. sessilifolia*, but not of *W. amplexifolia*, the sepals and petals of which are white or pink. It seems clear, therefore, that Nuttall, for whatever reason, regarded the West Florida material as conspecific with that of East Florida, since he clearly amplified the description of *Warea amplexifolia* to include the West Florida element.

The original description of the genus *Warea* was thus based upon three elements: *W. amplexifolia* (Nutt.) Nutt. (the type species of the genus), *W. cuneifolia* (Muhl. ex Nutt.) Nutt., and the then unnamed *W. sessilifolia* Nash.

Without specific reference to *Warea amplexifolia*, Nash (1896), fifty-two years later, resolved the problem by describing the plant of West Florida as representative of a new and distinctive species, which he named *Warea sessilifolia*. The original description of this species was based upon Nash's No. 2544 "Collected in the pine lands at Bellaire, about 4 miles south of Tallahassee, Leon County".

Impressed by the ". . . remarkably inconsistent descriptions that have been applied to the plant we have known as *Warea amplexifolia* . . .", Small (1896), whose interest in the subject was renewed by Nash's description of *W. sessilifolia*, investigated the situation. Small pointed out the fact that Nuttall (1822) described *Stanleya amplexifolia* on the basis of eastern Florida specimens having amplexicaul leaves. Small observed further that Nuttall (1834) founded the genus *Warea*, at least in part, upon a plant from western Florida having merely sessile, non-clasping leaves. According to Small, Nuttall, ". . . failing to see that his *Warea amplexifolia* was different from *Stanleya amplexifolia*, com-

bined the original description of *Stanleya amplexifolia* with that of *Warea amplexifolia* . . ." Inasmuch as the amplified description of *Warea amplexifolia* (1834) was largely based upon the previously undescribed element of western Florida (a point already shown to be supported both by Nuttall's plate and notation "Hab. in West Florida"), Small assumed the western element to be the sole species intended by Nuttall by this name. Small apparently considered the actual species, *S. amplexifolia*, never to have been transferred to *Warea*. Small (1896) lists the binomial as "*Warea amplexifolia* (Nutt.)." which we interpret as Small's way of signifying his claim of credit for the transfer. Indeed, Small is listed as the author of the transfer in his *Manual* (1933). But, as Harper (1950) has pointed out, this represents "a somewhat questionable proceeding." Nomenclaturally, even if inadvertent, Nuttall's transfer was completely adequate, since the basionym was properly cited. That Nuttall used the name in a broad sense (including two elements) has no bearing upon the propriety of the transfer, the full author citation being "(Nutt.) Nutt."

Despite the evidence that Nuttall by 1834 was in possession of a mixture of East and West Florida material, Shinnars (1962) maintains that Nuttall did not have a mixture. This presumptuous conclusion was reached after Shinnars solicited the aid of Dr. Walter M. Benner in searching for the existence of authentic Nuttall material at the Philadelphia Academy and finding only one specimen named by Nuttall, a specimen with sessile leaves. "In other words", according to Shinnars, "the only concrete evidence we have indicates that Nuttall did not have a mixture, and the only thing he did have was the plant shown in his illustration of *Warea amplexifolia* [a plant with flowers!]. This is identical with *W. sessilifolia* Nash, and the plant thought to be *W. amplexifolia* by Nash, Small, and Payson becomes *W. auriculata* Shinnars, sp. nov.," notwithstanding the obvious conflict created with the original description of the type material of *Stanleya amplexifolia* as an avowed fruiting specimen, no flowers having been seen!

Shinners proceeded then to apply the Nuttallian epithet "*amplexifolia*" to the sessile-leaved West Florida plant (*Warea sessifolia* Nash) and to treat the conspicuously auriculate-leaved plant from East Florida as a new species, *W. auriculata*. Indeed, following Shinners, "Much more important than supposition is the question of what Nuttall actually had." In an effort to settle this issue the present writers requested the assistance of Dr. Norman K. B. Robson, of the British Museum, in locating a Nuttall type answering to the following description, which we supplied: "The type specimen of *Warea amplexifolia* (Nutt.) Nutt. (*Stanleya amplexifolia* Nutt.), if extant, is presumably at the British Museum. It was supposedly collected by A. Ware from the arid pine forests of East-Florida during the months of October and November, 1821. The specimen Nuttall described was a fruiting specimen (no flowers having been seen) and it had only a few upper leaves which were auriculate and clasping the stem." Dr. Robson has kindly aided us with the following reply: "Yes, there is a specimen of *Warea amplexifolia* (Nutt.) Nutt. in Nuttall's collection answering the description which you gave. It is labelled by Nuttall 'Stanleya or a n. Genus.\* *Stanleya amplexifolia*. East Florida.' 'Warea' has been written later by him on a separate label. The specimen is mounted on the same sheet as a flowering specimen labelled 'Amplexicaul Stanleya' in other writing." Although the flowering specimen is obviously not a part of the type, we accept the fruiting specimen as the holotype and conclude that the application of the name *Stanleya? amplexifolia* Nutt. [*W. amplexifolia* (Nutt.) Nutt.] is clearly fixed in the sense of the *East Florida, amplexicaule-leaved* plant. We are thus in complete agreement with Payson (1923) who wrote in reference to *Warea sessilifolia*:

"This species, although quite distinct, has been confused with *W. amplexifolia* in the past. The illustration given by Nuttall (Jour. Acad. Phila.) to illustrate that species is evidently of *W. sessilifolia*. In this publication also the habitat is given as "West Florida." It would seem that Ware

collected both species but the one originally described as *W. amplexifolia* was from east Florida and in it the leaves were truly amplexicaul. That plant then must retain the name because of priority of publication. However, the plant that Nuttall really had in mind when he described the genus *Warea* was that described by Nash as *W. sessilifolia*."

The leaves of *Warea sessilifolia* were described by Nash (1896) as ovate and sessile. According to a note accompanying the original description, ". . . the ovate merely sessile leaves, not sagittate nor clasping as in *W. amplexifolia*, readily distinguish this plant from either of the other species." One would infer from this quotation that the leaves of *W. sessilifolia* are merely rounded and not auriculate at the base. However, we have observed that at least some, and in most specimens many of the leaves are auriculate. While the auricles of *W. sessilifolia* are quite inconspicuous and do not extend around the stem as in *W. amplexifolia*, the separation of these two species cannot be made on the basis of the mere presence or absence of auricles as Small's (1933) key would indicate.

The fourth species of the genus was described by Small (1909) as *Warea carteri* on the basis of material collected by Small and Carter (No. 831) in pinelands between Cutler and Black Point, Dade County, in southern peninsular Florida. This species is related to *W. cuneifolia* and, like it, has petiolate leaves. Small (1896, 1903) described *W. cuneifolia* as characterized by "pectinate-fimbriate" petal-claws, although these are smooth or nearly so as illustrated by Gray (1848). Small's original concept of *W. cuneifolia* was apparently based upon the then unnamed species *W. carteri*. Upon incorporating the latter species into the Manual, however, Small (1933) erroneously indicated both *W. cuneifolia* and *W. carteri* to be characterized by pectinate-fimbriate claws. This condition, perhaps more accurately described as conspicuously pubescent under magnification, with trichomes exceeding in length the width of the claw, clearly applies only to *W. carteri*, the claws of *W. cuneifolia* being smooth or only minutely pubescent under magnification, with very short, inconspicuous papillose trichomes.

The following key, adapted from that of Payson (1923) and Small (1933), incorporates the corrections noted in this paper.

KEY TO THE SPECIES OF *Warea*

1. Leaves sessile, the blades rounded or rounded-auriculate at base
  2. Leaves conspicuously auriculate, the auricles adnate, clasping the stem ..... *W. amplexifolia* (Nutt.) Nutt.
  2. Leaves inconspicuously or not at all auriculate, the auricles free, not clasping the stem ..... *W. sessilifolia* Nash
1. Leaves subpetiolate or petiolate, the blades cuneate at base
  3. Petal-claws conspicuously pubescent; gynophore shorter than pedicel ..... *W. carteri* Small
  3. Petal-claws smooth or merely papillose; gynophore longer than pedicel ..... *W. cuneifolia* (Muhl. ex Nutt.) Nutt.

Specimens from the five herbaria consulted in this study (DUKE, FLAS, GA, GH, VDB) indicate the distribution of the species to be essentially that listed in Small's Manual, but more specifically: *W. amplexifolia*, central peninsular Florida (Orange, Lake, Polk and Osceola counties); *W. sessilifolia*, panhandle of Florida from Leon County westward into Escambia County; *W. carteri*, south peninsular Florida from Polk and Brevard counties southward into Dade County; *W. cuneifolia*, from Liberty and Gadsden counties, Florida, northeastward through the Coastal Plain of Georgia and South Carolina into Harnett County, North Carolina.

DEPARTMENT OF BIOLOGY, VANDERBILT UNIVERSITY AND  
DEPARTMENT OF BOTANY, UNIVERSITY OF GEORGIA

LITERATURE CITED

- GRAY, ASA. 1848. Gen. Fl. Am. Bor. Illust. 1: 155, 156. pl. 66.
- HARPER, R. M. 1950. A preliminary list of the endemic flowering plants of Florida. Quart. Jour. Fla. Acad. 12(1): 7, 8.
- MUHLENBERG, H. L. 1813. Cat. Pl, p. 61.
- NASH, G. V. 1896. Notes on some Florida plants — II. Bull. Torrey Club 23: 101.
- NUTTALL, T. 1822. A catalogue of a collection of plants made in East-Florida, during the months of October and November, 1821. By A. Ware, Esq. Am. Jour. Sci. 5: 297.
- . 1834. A description of some of the rarer or little known plants indigenous to the United States, from the dried specimens in the herbarium of the Academy of Natural Sciences in Philadelphia. Jour. Acad. Phila. 7: 83. pl. 10.



- PAYSON, E. B. 1923. A monographic study of *Thelypodium* and its immediate allies. *Ann. Missouri Bot. Gard.* **9**: 311-315.
- SHINNERS, L. H. 1962. *Warea auriculata* instead of *W. amplexifolia* of Small (Cruciferae). *Sida* **1**: 105, 106.
- SMALL, J. K. 1896. Studies in the Botany of the southeastern United States — VII. *Bull. Torrey Club* **23**: 409.
- . 1903. *Flora Southeastern United States*, p. 487.
- . 1909. Additions to the flora of peninsular Florida. *Bull. Torrey Club* **36**: 159.
- . 1933. *Manual of the Southeastern Flora*, p. 573, 574.